MILTON-MADISON BRIDGE REPLACEMENT

Andy Barber P.E.

Kevin Hetrick P.E.
Presentation Overview

KYTC lead
- Environmental Study
- TIGER Grant

INDOT lead
- Design – Build solution
- Bridge Sliding
- Project Status

Questions and Answers
Markland Dam
Project Site

I-275

Cincinnati

I-65

Louisville

Markland Dam

Study Area

Two Historic Towns – One Community

One of two Ohio River bridges between Cincinnati and Louisville

I-65 Bridge - 46 miles
Markland Dam - 26 miles
I-275 Bridge – 65 miles
Madison
Jefferson County, Indiana

• National Historic Landmark District
• Lower and Upper Madison
• Tourism
• Population 12,600
Milton, Trimble County, Kentucky

- Historic rivertown susceptible to flooding
- 2 National Historic Register districts
- Rural community divided by 400 ft tall bluff
- Population 600
US 421 Bridge Today

• 10,700 vpd (2008)
• 4% truck traffic
• 70% of bridge traffic destined for Madison
• 48 reported crashes on bridge in 4 years, plus other minor accidents (trucks knocking off side view mirrors)
• Last major rehabilitation in 1997
• Vehicular Weight limit of 15 tons posted in April 2009
US 421 Bridge History

- 3,181-foot long truss structure with two 10-foot wide travel lanes
- Built in 1929 by J. G. White through National Toll Bridge Company
  - Tolled until 1947: 5¢ for pedestrians, 45¢ for vehicles
- Purchased by Kentucky in 1939; half interest deeded to Indiana in 1956
US 421 Bridge Condition

• 2009 Sufficiency Rating of 6.5 out of 100 possible points
• Since 1994, $11.2 million invested in bridge
• Structurally Deficient & Functionally Obsolete
• Remaining Service Life of the structure estimated at 10 years
• Led by the “M3T” – leadership from KYTC, INDOT, and FHWA in both states

• Consultant Team: Wilbur Smith Associates with Michael Baker Jr, American Engineers Inc, Doe Anderson, plus 7 others

• Project established around 4 desired outcomes:
  – Achieve consensus with stakeholders, agencies, and the public
  – Create a bridge that is constructible & affordable
  – Federally approved Environmental Assessment
  – KYTC & INDOT will own only one bridge between Madison and Milton

• Extensive coordination with stakeholders: resource agencies, historic preservation groups, Project Advisory Group, and members of the public

• Extensive media coordination
Unique Project Challenges

• Historic districts & properties, including National Historic Landmark District at northern bridge abutment

• Numerous public parks, including city park beneath northern bridge approach

• Steep terrain and unusual highway connections

• Coordination between agencies & states

• Managing community expectations: cannot fix all problems, i.e. “Milton Hill”

• Securing adequate funding
Kick-Off

July 2008-October 2008

• Project Kick-Off Activities
• Media Coordination
• Formation of the Project Advisory Group (PAG)
• Agency/Section 106 Invitations
• Data collection in the study area to identify roadway deficiencies and environmental constraints
Milton-Madison Bridge Project
Purpose and Need

- Improve or replace functionally obsolete/structurally deficient bridge
- Improve or maintain cross-river mobility and community connectivity
- Improve safety

Developed with input from resource agencies, Project Advisory Group (PAG) members, local officials, and the public
All alternatives were considered including: Do nothing, rehabilitation, tunnel, pontoon bridge, and other ideas.
Key Finding of the Initial Screening Process

- Sixteen alternatives reduced to five through technical analysis & public input.
- Six alternatives eliminated because they did not meet Purpose & Need
- Five alternatives eliminated because they would have major impacts or face excessive challenges (Red Flags)

A Public Advisory Group, cooperating agencies, and 106 consulting parties were constantly involved in the project. This made the accelerated decision making easier to communicate.
Tiber Creek A
Superstructure Replacement

Tiber Creek B
Canip Creek

Tiber Creek A
Superstructure Replacement
Minimal Approaches

Superstructure Replacement
Minimal Approaches
Screen Alternatives (Level 2)
May 2009 – December 2009

5 Alternatives were reduced to 1 Proposed Action

- Input from PAG
- Agency/Section 106 comment period
- Public Input
- Additional Environmental Data Collection & Technical Analysis
The Proposed Action

Based on a variety of factors, the Superstructure Replacement with Minimal Approaches Alternative emerges as a leading option:

- Continued Bridge Deterioration documented in Fracture Critical Inspection
- Limited impacts to Historic Resources
- Investigations indicate piers are structurally sound
- Lowest Cost Alternative
- Availability of TIGER Grant program
- Fastest Completion and one year maximum closure time
TIGER Grant

- 2009 American Recovery and Reinvestment Act

- Priority given to projects that create jobs, improve the economy, and can be completed by February 2012.

- In September 2009, the project applied for $95 million in funding.

- In February 2010, the project was awarded $20 million in funding.
Superstructure Replacement with Minimal Approaches

- Milton Approach re-construction
- Structure No. 1 replacement
- Structure No. 2 replacement
  - Scour Mitigation and Pier Strengthening
  - Superstructure Replacement

3 replacement of Structure No. 4

No Right-of-Way required
Proposed Pier Work

Proposed Bridge

Navigation Channel does not need to be widened

Milton, KY

Madison, IN

<table>
<thead>
<tr>
<th>Pier 9</th>
<th>600’</th>
<th>Pier 8</th>
<th>600’</th>
<th>Pier 7</th>
<th>727’-3”</th>
<th>Pier 6</th>
<th>254’</th>
<th>Pier 5</th>
<th>150’</th>
</tr>
</thead>
</table>

Strengthen Existing Pier
New Pier Cap
New Pier
Typical Existing River Piers

- Reinforced Pier
  - Stem dowelled
  - 12’ into caisson

- Un-reinforced Caisson

- Un-reinforced Rock Socket
  - 2’ to 7’ deep

- Sand & Gravel
- Shale w/ Limestone
- Boulders
To support the development of a D/B scope, Michael Baker developed a Pier Strengthening Report to document a pier rehabilitation solution that is:

- Designed for 75 year service life
- Cost Effective and Feasible with regards to meeting today’s design requirements
- Permittable – No reductions in navigation channel
- Visually Acceptable to the communities and historic consulting parties
Proposed Pier Strengthening

1) Drill holes into existing unreinforced caisson
2) Grout dowels into holes and extend above top of caisson
3) Add stem reinforcement
4) Form and cast collar and new cap
Final Scour Design Sketch

SECTION A1-A1

PLAN VIEW

APPROXIMATE DREDGE LIMIT

VARIABLES

4.5W

2W = 42'

11' L

CONTRACTION SCOUR
Cw = 2.2
EL = 397' +/- (ORD)

AMBIENT BED EL = 397' +/- (ORD)

REND FORM TROUGH EL = 385' +/- (ORD)

ASSUMED CHANNEL BOTTOM EL = 400' (ORD)

NORMAL POOL EL = 420' (ORD)

EL = 405' +/- (ORD)

W = 21'

1.5 L

12" +/-

4.5W = 29'

WETRIP - SPECIFIC GRADATION (SEE TABLE)

GEOTEXTILE FILTER LIMITS

TOP OF ROCK

WRAP FILTER UP FACE OF PIER AT LEAST 2' (600"

REPLACE EXISTING TIMBER SHORING IF ENCOUNTERED TO EXPOSE CONCRETE FOR PULL DEPTH OF TOP RAP

500 YR FLOOD EL = 474.5' (ORD)

1V = 8.5V F/S

E1 = 1.5

E2 = 1.1

E3 = 1.5

E4 = 1.0
Why Design-Build?

Decision to pursue TIGER Grant placed a premium on starting project soon and completing in 2012.

No R.O.W. required and minimal utility relocations left Design as critical path development item.

Design-Build allowed engineering and construction procurement to occur at the same time.
Typical Bridge Project Timeline

Milton Madison Project Timeline

$50 million Budget Savings

4 to 6 Year Schedule Reduction
Accelerating with Design - Build

Formula for Effective Bid Price
lowest effective bid wins

\[ A + B - \text{Adjustment} \]

- \( A = \) construction cost
- \( B = \) closure days \( \times \) $25,000/day.
- \( \text{Adjustment} = \) $3.75 million for early opening
<table>
<thead>
<tr>
<th>Month</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2010</td>
<td>• INDOT advertizes design-build contract</td>
</tr>
<tr>
<td>Sept 2010</td>
<td>• Contractors submit proposals</td>
</tr>
<tr>
<td>Oct 2010</td>
<td>• Walsh awarded bridge contract</td>
</tr>
<tr>
<td>Nov Dec 2010</td>
<td>• Design Continues and</td>
</tr>
<tr>
<td></td>
<td>• Permit Updates</td>
</tr>
<tr>
<td>Jan 2011</td>
<td>• Mobilize and Work Platforms</td>
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</table>
September 22, 2010
Five Contractors submitted bids

Project was awarded based on
- Cost to construct project ($102-$127 million)
- Length of bridge closure (10-365 days)
- Date to open bridge to traffic (Sept 2012/May 2013)

Walsh had the lowest bid based on these factors
Proposal for Design Build Process

Innovative construction process:
Award of construction contract in September 2010 to Walsh Construction - Burgess & Niple - Buckland & Taylor

Build a new truss on downstream piers while the existing bridge remains open to traffic

Strengthen existing piers

Remove old truss and slide the new truss onto the strengthened existing piers

Shortest closure periods (approx 10 days)
Proposal for Design Build Process

Similar Bridge-Sliding Projects

1. Trenton Ontario Bridge
2. San Francisco Bay Bridge
3. Old Capilano Bridge

video link on MMB website
Design-Build Process

Step 1
- Existing bridge remains open to traffic
- Detour approach ramps are built on Vaughn Dr and KY 36
- Pier strengthening and widening begins
Design-Build Process

Step 2
- Bridge closes to traffic for 5 days
- Approach ramps are connected to existing bridge
- Existing bridge reopens to traffic
- Pier strengthening work continues
Design-Build Process

Step 3 - Downstream bridge piers are constructed
Design-Build Process

Step 4
- Existing bridge remains open to traffic
- New truss superstructure is erected on downstream piers
- Permanent approaches are built
Design-Build Process

Step 5
- Downstream bridge is connected to US 421
- Traffic is rerouted onto downstream bridge
Design-Build Process

Step 6
- Existing bridge is demolished
Design-Build Process

Step 7
- Traffic remains on downstream bridge
- Detour approach ramps are removed
- Pier strengthening and widening is completed
Step 8

- Downstream bridge closed for 5 days
- Using steel rails and plates, new truss superstructure is moved from downstream piers to its permanent place
- New Milton-Madison Bridge opens to traffic
- Downstream piers are removed
How long will the bridge be closed?

Originally planned for a 365-day closure

Walsh Bid included a total 10-day closure

Closure divided between two separate periods: Late Spring 2011 and Late Summer 2012
Bi-State Partnership
QUESTIONS?